Central Valley Salmonid Satellite Project Work Team -
Juvenile Monitoring Project Work Team

Meeting Notes
February 15, 2005
Sacramento National Wildlife Refuge Complex

Participants: Bill Poytress-(chair-FWS), Jim Earley (FWS), Richard Corwin (USBR), Erin Chappell (DWR), Jason Kindopp (DWR), Matt Brown (FWS), Tim Heyne (DFG), Tracy McReynolds (DFG), Jess Newton (FWS), Tom Cannon (Wildlands Inc.), Jim Smith (FWS), Andrea Fuller (SP Cramer), J.D. Wikert (FWS-AFRP), Ryon Kurth (DWR), Diane Coulon (DFG), Mike Gorman (FWS).

I. Modify/Adopt draft meeting notes from 12/2/04 – No comments-notes adopted.

II. Modify/Adopt agenda - The agenda was modified to add Jess Newton as a presenter of stranding study methodologies implemented on Clear Creek.

III. Discussion topic: juvenile salmonid stranding studies (projects, techniques, and results).

a) **Matt Brown (FWS)** – *Monitoring Juvenile Isolation and Stranding in Clear Creek.*

Matt's presentation was concerned with the following main topics: Improved restoration planning and design, improved hydrograph for late-fall Chinook and steelhead trout, ramping rate recommendations including why their approach might not work for other streams, and a scour channel study. To evaluate isolation and stranding, Matt's group looked at ramping down low flow releases and ramping pulse or flushing flows. Additionally they looked at the stream channel restoration project in terms of floodplain surfaces and scour channels/anti-stranding channels and its relationship to stranding. One of the lower reaches of Clear Creek (CC) until recently has had many gravel borrow pits with differing connectivity, all of which had the potential to strand juvenile salmonids. Surveys were conducted to identify isolation problems and resulted in the conclusion that extending increased flows for 2.5 months in the spring would reduce the likelihood of isolation of late-fall Chinook and steelhead juveniles. They noted that the historic (pre-Whiskeytown dam) hydrograph would be best to mimic in the spring/early summer to reduce isolation, instead of substantially dropping flows in April as had been the standard operating procedures.

Some of the stranding studies conducted on CC had been the result of the NOAA mandated OCAP BO required evaluation of all CVP/SWP dammed rivers. Matt's group wanted to quantify stranding by comparing to natural rates of stranding, to correlate the number of fish stranded per meter squared with the CC rotary trap juvenile passage index, and to look at day vs. night stranding as well as Chinook versus steelhead stranding. **R. Kurth** asked about what he meant by "natural" stranding rates. **M. Brown** responded that they would seek to not actively manage releases from Wiskeytown dam. Matt went on to discuss methods of sampling whereby they began with entire gravel bars

and then turned to sub-sampling of areas. Essentially, the field crews would mark the high water line with flags before ramp downs and the low water line when flows stabilized. The crews turned over rocks in survey areas and quantified the area and the number of fish noting where the fish were stranded. From these studies they recommended to NOAA that operators should limit ramp down rates to 0.1 ft/hr (~15cfs/hr), and the flow reductions should occur during night time hours in the entire anadromous reach. This would require about 9 days of ramp down in June, with exemptions above 300cfs. Considerations for exemptions should also include: time of year, size of fish/vulnerability, protection status of vulnerable fish, time of day, if events are timed to occur with natural changes in flow or turbidity, the amount of water required and the relative costs or benefits of proposed flows.

Matt continued with why this approach may not be applicable for other systems noting: system intent (hydro, agro/irrig, flood control etc..), flow considerations and differing stream channel morphology.

For scour channel studies they want to know the isolation risk, predation risk and rearing habitat value of the area. This will be a challenging undertaking considering how to effectively sample very different habitats that will change over time, how to assess connectivity/fish passage, and quantifying benefit of small amounts of habitat in an open system.

b) **Jess Newton (FWS) -** *Stranding Study Methods on Clear Creek.*

Jess presented information on the methods used for two stranding event types; ramp-downs (gravel bars, low floodplains) and natural storm events (constructed and natural floodplains, gravel bars/low floodplains). For controlled releases field crews would mark the waters edge with stake wire flags prior to a known release. He noted that this requires flow travel time estimates and that they use multiple stage gauges to calculate this. For natural events crews would mark the water's edge with wood chips (preferred) or debris lines. For detecting stranded juvenile they sample the entire area when possible, but on large gravel bars and floodplains systematic sub-sampling often occurs by using transects of 1 m in width or quadrats of 1m², respectively. Information gathered in surveys includes: fish/m², total area of gravel bar (using total station equipment), fish species and fork lengths, substrate type, slope of bar and data indicating if fish were stranded or isolated. Jess stated that for surveying large floodplains they used aerial photos and ArcMap software to delineate quadrat sub-sampling and to calculate floodplain area.

Results from stranding studies appear to indicate that most fish are fall run Chinook between 28 and 42 mm FL and the substrate is typically cobble (~60%) followed by sand (~25%). Results are somewhat mixed in terms of differences between night and day and controlled releases and natural. **M. Brown** and **J. Smith** noted that predators can make it difficult to truly evaluate stranding. Overall, Jess concluded that stranding on CC is relatively low (0.0 – 0.03 chn/ft²) and that mostly fall run (28-42 mm FL) have been found in their surveys. Additionally, Jess noted that eggs have been found in sandy areas. **R. Corwin** asked where Jess thought the eggs may be derived from: drifting or from redd scour. Jess responded that they were likely from redd scour.

Questions remain as to the relationship between stranding and: rates of stage decrease, abundance of small fish (scaling factor), day vs. night, natural vs controlled events, site topography, and substrate size.

Comments/follow-up questions: R. Kurth noted that Jess' group had put impressive effort into their studies and the number of locations they surveyed. He then asked about how many people it takes to do this work and the numerous sites. Jess responded by saying that it took a lot of pre-planning/logistical planning and that about 8 people were needed to conduct the surveys of the multiple sites for each event, noting that there is lag time (in terms of flow) between sites that can be used to one's advantage.

c) **Ryon Kurth (DWR) –** *Juvenile Steelhead Stranding and Chinook Salmon Stranding in the Lower Feather River.*

Ryan began with background information noting that stranding results from controlled and natural flow fluctuations. He noted that typically, controlled fluctuations have more severe impacts. The impacts of flow fluctuations are related to channel morphology, substrate type, the magnitude, rate and frequency of the fluctuations as well as water temperature, time of year or day, species and life stage at the time of fluctuations. Ryan described two types of stranding as beach stranding and isolation basin stranding. He then noted that beach stranding was not being investigated due to probable inaccurate data that would result due to the effects of predation and unreliable quantification. Additionally he stated it is generally believed that the impacts are relatively minor for this type of stranding.

The Feather River stranding study objectives were to determine the amount of potential stranding area and to note the resulting fish stranding that occurs during flow reductions. Further, they needed to evaluate the biological significance of the proportion of the juvenile salmonid population loss that occurs due to stranding, as well as to assess the ability of current flow fluctuation guidelines to minimize stranding events and impacts. The study area considered was the high flow channel (HFC) below Oroville dam because it tends to have variable flow (1-5 Tcfs) and greater channel complexity with multiple floodplains.

The study methods included quick identification (after an event) of all ponds, noting river mile, flow, surface area and pond classification. Sampling a subset of the ponds for stranded salmonids whereby fish were identified, enumerated, measured and assigned a run according to length-at-date criteria. Fish density was then calculated. The total number of stranded salmonids was computed by multiplying mean fish density by total ponded area.

Ryan described three pond types as pot hole, off-channel, and side channel ponds. **M. Brown** asked what criteria are used to designate a pond versus a puddle? Ryan responded by saying a pond is roughly $\geq 10ft^2$; less than would be considered a puddle. Ryan then discussed the different methods/gear types used to sample differing pond habitats. For shallow ponds devoid of major obstructions they employed beach seines. Ponds over 1m deep were typically sampled using direct observation techniques (snorkel survey) along transects. For others ponds that were not suitable for either of the two former gear types, electrofishing techniques were employed.

In terms of data analysis, fish size, pond type and river mile and month were compared to the risk of stranding. Moreover, the relationship between cumulative

amounts of stranding area per incremental reduction in flow was investigated. The results of the data analysis indicated that between 0.16% and 0.71% of the annual production was estimated stranded for three years of studies. There were no statistically significant differences found between: mean size of stranded vs. non-stranded salmonids (rst captures), mean size between ponds or the rank abundance of pond type. Furthermore, no statistical relationship was noted between relative abundance and river mile. For the investigation of the relationship of stranding and incremental reductions in flow, there were relatively large increases in rates of stranding noted for flow reductions between 2,400 and 2,300 cfs and 1,700 and 1,500 cfs.

Recommended ramp down rates to reduce stranding impacts for the Lower Feather River were: Low Flow Channel ~1/10'/hr (200 cfs steps) and High Flow Channel 2-5" /hr (200 and 500 cfs steps). Conclusions thus far: impacts to juvenile salmonids appears minimal in comparison to emigrant abundance, no statistical relationships noted for variables studied, stranding appears to occur predominantly at the 2500 and 1700 cfs range, and current ramping rates compare favorably to other regulated river systems.

Comments/follow-up questions: M. Brown - Does the size class of stranded fish match those captured in rotary traps? **R. Kurth**- Size class is similar during the period surveys were conducted and fish were generally small (fry). Question raised about how 2-5"/hr ramp rate determined. Answer-based on IFIM study. A brief discussion ensued between Matt and Ryan (and others) about the accuracy of flow values, Matt indicated that flow values are not as critical as stage difference when determining ramping rate. Cooperation between fish management entities and water operators is a huge part of the equation. Flow estimates are usually in ranges and changes should be small over time. **J. Newton** asked about area vs. discharge. Ryan responded by indicating that the data was empirical data based on boat surveys and aerial work(?). **T. Cannon** asked which months surveys were conducted. Ryan answered January through June and based on presence. T. Cannon asked if surveys were conducted below Yuba. Ryan indicated no, as it would be difficult to determine if the fish found in that area were from the Yuba River or Feather River. **B. Poytress** asked if the surveys were still being conducted, the answer –yes.

M.Brown asked about ramping recommendations and Ryan responded with 1'/hr for most discharges but sometimes it is not as critical. Typically flows decreasing below 7,000 to 8,000 cfs have the potential for isolation.

d) **Tom Cannon (Wildlands Inc.) –** *Improving Habitat While Reducing Stranding.*

Tom presented evidence of bypass stranding that could potentially result in serious negative impact on salmonid populations, sturgeon and other species. He noted that he has observed typical Chinook fry densities to be around 10 fish / ft². He explained slides of the Fremont weir which upon cresting the Sacramento River flows into the Yolo Bypass. He noted that the Fremont Weir spills every 2-5 years. He estimated over 500,000 fry were stranded in a single year. He found in the "Sturgeon Hole" adult sturgeon and Chinook fry & fingerlings. The sturgeon were found to still be alive in April and July. He also noted winter Chinook adults in the bypass.

In the Colusa bypass, December and January stranding of smolts occurred, likely winter Chinook. DWR eliminated some or all of stranding ponds in 1999, but bypass

continues to scour each year. In the winter of 2002/2003 there were multiple overflow events and subsequent stranding events.

Tom noted how the Sacramento River can have a flood effect on the lower Feather and Yuba and can result in stranding in those areas too.

Another type of stranding he has noted is "farm field" stranding such as the Cosumnes River floodplains that essentially are flooded agriculture fields. Other stranding such as bar stranding occurs on the lower American River. Side channels on bars lose connection to river when flows decline and strand juvenile salmonids. Additional stranding/isolation occurs on the lower American in levee borrow pits. He noted the recent American River flood control release of 8,000 cfs ramped down to 2,000 cfs over four days as an attempt to discourage steelhead spawning (i.e. to not attract steelhead to begin spawning), yet it likely has stranded a large number of juvenile salmonids. It appears that this year the American will have a new set of issues in response to the recent flood control approach. He indicated that there is 6 miles of borrow ponds on the American and 20 miles on the Feather (with a crude estimate of 1% production stranded). Tom showed evidence of young salmon seined in lower American and noted that 12" Chinook had been seen while snorkeling scour holes and borrow pits of the lower Yuba. Some fish survive.

Tom's aerial photos indicated extensive borrow pits along the mouth of the Feather River and down the Sacramento River. Surveys indicate stranding of over 50,000 smolts in these areas. More evidence has indicated large numbers of smolts in some borrow pits in various locations as late as April.

The Calaveras River annually produces "irrigation" stranding when river flows are diverted in the spring and summer. His group used fyke nets to sample salmonids there. Other examples include the Natomas Cross Canal and Auburn ravine where adults go up streams in fall or winter and juveniles are diverted into fields as they emigrate out.

Tom noted that in the past many borrow pits had culverts, but they weren't maintained; the levee reaches are the worst areas. He said a good indication of stranded salmonid juveniles it to check the stomachs of largemouth bass or crappie in borrow ponds. He also noted in one mark-recapture type of study of stranded salmon that when able to leave isolated areas, 10% of marked fish left the area in the first 2 hours of the night. Additionally, ox-bows are excellent rearing areas but when disconnected become stranding/isolation areas for juveniles.

Tom concluded by stating that all/most of his information is anecdotal in nature, usually the result of independent investigations of his own on weekends. He noted that stranding may not be much of a problem on the upper River tributaries, but the lower 200 miles has serious problems.

Comments/follow-up questions: M. Brown asked who owns these areas (bypasses) and who is responsible for them? Reply - some private, some public; these areas connect and disconnect frequently especially when you consider river stages can fluctuate 10ft over night. There seems to be controversy over whether bypasses strand fish or not. Many studies indicate that it is not a problem when confined to streams and gravel bars but it is in the lower watershed. **B.Poytress** asks if there are known long-term solutions given the dynamic nature of the river system. Reply - CALFED is interested in solving issues in natural systems and these are not natural systems. He recommends annual maintenance of flood control bypasses, and to dig out disconnected ox-bows and fill borrow pits. **J.**

Smith inquired about what systematic surveys have been conducted in the most problematic areas. Reply – The USFWS and the Wilderness Society (?) conducted a survey of Sacramento Weir at one point and transferred some stranded fish back to the river channel. **J. Smith** noted that this may tie into the "blackhole theory" of the middle river, but the problem is so extensive, how would you fix it. Tom replied that some fixes to the Yolo Bypass such as notching the Fremont weir to allow flow to go through the bypass through April would help. Maintaining ladders and notches could provide improvements to the situation. He noted that every place has a solution and that they have unique issues which need unique fixes. We need to manage (or maintain?) managed systems.

Lunch Break 12:30 to 13:00

III.I. Discussion of potential future meeting topics and group priorities.

B. Poytress brought to the attention of the group the idea of tentatively setting the date and topic of the next meeting. Discussion ensued among many group members the result being a tentative date set of Thursday May 19th with the topic being juvenile Chinook underwater observation survey techniques and results (e.g. snorkel surveys). Other potential future topics mentioned were habitat use studies, information/data management, suitability indexes, restoration monitoring (pre vs. post/adaptive management) and Trinity River juvenile studies.

Discussion among many group members (**M. Brown, J. Kindopp, J.D. Wikert etc..)** ensued about the potential to follow-up on topics, goals of the team, recommendations of the team and ways to re-analyze covered information. **B. Poytress** indicated the group can put forth recommendations and any conclusions that arise from meetings in notes that are to ultimately be forwarded to the parent team-the Central Valley Salmonid Project Work Team.

III. Discussion (general) of stranding topic continued:

J. Kindopp stated it appears that stranding on tributaries it minimal, but there is no known data for the downstream areas. **T. Cannon** noted that NOAA can't even screen the 2,000 unscreened agricultural diversions in the lower river area and that CALFED mandates natural processes to solve issues. **J.D. Wikert** noted that there needs to be a change on how to do things and to identify projects and work for CALFED and others to prioritize in order of importance. He noted there are issues between the Stockton and Red Bluff offices that should be dealt with and to figure out who should be looking into the bypass areas (i.e. jurisdiction?). He also mentioned that AFRP funding is variable in terms of source and amount from year to year. Essentially it appears that the area in question is not covered by any entity exclusively. **T. Cannon** recommended the group produce a "white" paper to submit to CALFED regarding this issue. He figured collaboration amongst our groups' members may have some weight and CALFED may listen if we put forth study ideas or recommendations. Ultimately a proposal to fund systematic stranding studies in the Yolo bypass may be a start at addressing the problem. **R. Corwin** stated that as a satellite group we could review the issue and then pitch recommendations to the parent work team to review and potentially

involve CALFED. **E. Chappell** noted that a collaborative PSP submittal investigating "the black hole" might have substantial weight. **T. Cannon** noted that in an issue paper (a.k.a. white paper) we could ask the question of how important is this section of river (lower 200 miles) to CALFED and others. Do we want to produce more fish or increase rates of survival? **J. Kindopp** noted that otolith studies and different techniques may determine the impact of spring Chinook rearing in the middle river areas and ultimately the contribution to adult returns.

B. Poytress asked the group if they all agreed this was a problem. The response from the group was that they would like to see data gathered to date of this issue. The idea of mining old DFG stranding data to assist in the production of a white paper was mentioned. **J.D. Wikert** said we need a nutshell message to present to the parent team. **T. Cannon** noted that the SRCAF has thus far ignored reach three of the Sacramento River (Colusa to Verona). We need to figure out the relative importance of the lower river to salmon populations and decide if something needs to be done about it. **E. Chappell** noted that from a data perspective this area is a black hole and has thus far not received funding. The discussion morphed into the topic of juvenile cwt/radio/pit tagging studies and talk of wild stock tagging at RBDD. **B. Poytress** stated that it had been done in the past with fall Chinook but he did not know the result of the studies. **M. Brown** noted that the study design was weak and that it could be improved upon. No members had too much information as to the result of the short-lived program. **B. Poytress** noted that his predecessor had envisioned wild stock tagging of juvenile winter Chinook and **E. Chappell** stated NOAA may be open to that type of study at this point. She added it is a matter of time and money. **E. Chappel** then notified the group of an upcoming CALFED symposium on the feasibility of a comprehensive PIT tag study in the Sacramento system. Many members figure it would be very expensive or not too feasible off-hand.

Discussion of the issue continued and **M. Brown** noted that there appears to be a large area of problems and studies need to be done to determine which ones have the largest impacts on salmonids. How do you determine that? **T. Cannon** noted that borrow ponds alone kill many more juvenile salmon than the Delta pumping facilities. A group member noted that studies relating discharge to stranding in Sacramento River similar to Feather river studies would be useful.

B. Poytress concluded the meeting by saying he would write-up the meeting notes, talk with a parent team member(s), and prepare some recommendations and conclusions for satellite group members to review noting this could take quite some time and effort.

IV. Recommendations:

R1: The JMPWT recommends that effort be put forth to determine what is known about the effect(s) of stranding to native anadromous fish populations emigrating through flood-control bypasses and levee borrow pits along the lower 200 miles of the Sacramento River.

R2: The JMPWT recommends comprehensive multi-year systematic surveys of the flood-control bypasses and levee borrow pits in an attempt to quantify the rate of

juvenile salmonid stranding in the lower 200 miles of the Sacramento River (provided the data does not exist or is not of a robust nature).

IV. Recommendations continued:

R3: The JMPWT recommends communicating directly with the Central Valley Salmonid Project Work Team (parent group) that the effects of stranding in large flood-control bypasses or borrow pits that are not actively managed to reduce isolation may have a significant impact on the rate of survival of salmonids produced in the upper Sacramento River and its tributaries. Furthermore, thorough studies of this area may provide insight into the "black hole" theory and may result in the filling of an important data gap.

V. Conclusions:

C1: Stranding survey data gathered from monitoring activities on specific tributary populations appears to indicate that the overall impacts in surveyed tributary habitats are minimal relative to their respective abundance estimates (i.e. losses are typically below 1% of annual production estimates).

C2: Substantial anecdotal evidence and a lack of robust stranding data may suggest that flood-control bypasses and inadequately maintained borrow pits have the potential to greatly impede fish passage in the lower Sacramento River resulting in significant deleterious impacts to native anadromous fish species populations. Moreover, information needs to be assembled, and further gathered if lacking, in an effort to completely assess the impact of these areas with the overall goal of prioritizing this region as a component of the ultimate goal of improving fish passage and restoring native anadromous fish populations to sustainable levels.

VI. Tentative Agenda Items for the proposed May 19th meeting:

The proposed next meeting of the Juvenile Monitoring Project Work Team is Thursday May 19th, the topic being juvenile Chinook underwater observation studies and methodologies (i.e. snorkel surveys).